



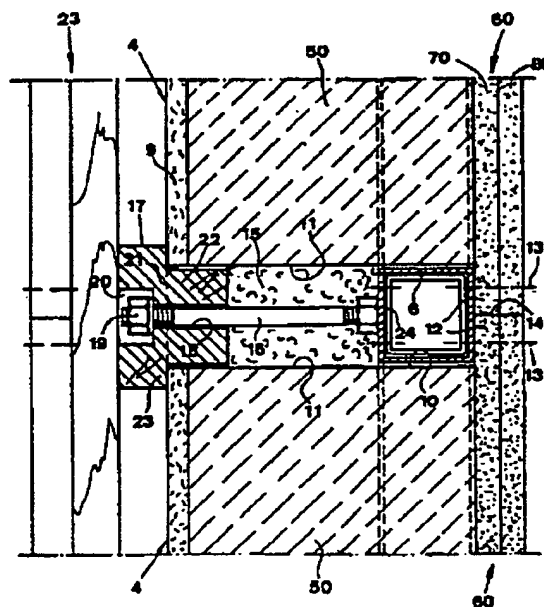
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(54) Title: A BUILDING STRUCTURE AND A METHOD FOR PRODUCING THE SAME

(57) Abstract

A building structure and a method for achieving the same are based on the use of pre-fabricated wall sections (4), which can be applied on a foundation, and generally vertical metal bars (6), which are arranged in a space (10) defined by edge portions of two adjacent wall sections (4), facing towards each other, the dimension of the bar in the thickness direction of the wall sections being less than the thickness of the wall sections and the wall sections comprising a high quality isolation material (50), such as plastic foam. Each one of the pre-fabricated wall sections (4) has a relatively stiff surface layer (60) fastened on the side of the wall section intended to be placed inwardly of the structure, said surface layer (60) being e.g. one or several gypsum boards. The space for the bar is partly limited by such portions (12) of the surface layer of the two wall sections, which extend past the adjacent isolation material portions of the wall sections while overlapping the bar. The wall sections (4) are fastened to the bar (6) by means of fixing members (13) extending through the surface layer portions (12) and engaging the bar.



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A building structure and a method for producing the same.

BACKGROUND OF THE INVENTION AND PRIOR ART

This invention relates to a building structure of the kind comprising a foundation, such as a base plate, base socket, an intermediate floor structure or the like, at least two pre-fabricated wall sections located on the foundation and an essentially vertical bar, made of e.g. metal, which is arranged in a space defined by the edge portions of the wall sections facing towards each other, the dimension of the bar in itself, considered in the thickness direction of the wall sections, being less than the thickness of the wall sections, and said wall sections comprising a high quality isolation material, such as plastic foam. In addition this invention concerns a method for producing such a structure.

Such a structure is described in the Swedish specification 440 674. In the known structure adjacent wall sections are arranged to connect with each other both on the outside and the inside of the wall without being bridged by the bar. The wall sections are made of plastic foam. The bar will thus be encircled by plastic foam material. This will cause problems with the strength so far as the wind loads on the wall sections tend to move the wall sections transversally relative to the bar. Since the bar is encircled by plastic foam material which has in this connection a relatively low strength a risk exists that wind loads after a certain time will cause deformation of the plastic foam material so that a clearance arises between the wall sections and the bar. Such clearances will accordingly allow a certain relative movement between the wall sections and the bar, which will cause cracking problems and untightness in the wall structure. Another problem in this known structure is that difficulties are associated with application of outer coverings in a stable and reliable way on the walls formed by the plastic foam sections.



BRIEF DESCRIPTION OF THE INVENTION

The object with the present invention is to devise ways to overcome the above described problems.

In attaining a structure stable against wind loads etc. the invention is based on the fact that each one of the pre-fabricated wall sections on its side which is intended to face inwardly of the structure, has a relatively stiff surface layer, e.g. one or more gypsum plates, secured to the wall section, that the space for the bar is partly limited by such portions of the surface layer of the two wall sections which extend past the adjacent isolation material portions of the wall sections while overlapping the bar, and in that the wall sections are secured to the bar, by means of fixing members extending through said surface layer portions, which extend past the adjacent isolation material portions of the wall sections, and engaging the bar.

In the invention the stiff surface layer on the wall sections will thus be firmly fixed directly to the bar. Since the surface layer firmly connects with the plastic foam layer of the wall sections, e.g. by direct foaming or glueing, the plastic foam layer and the bar will generally not be in any direct connection for transferring forces. Thus, no risk for unacceptable deformation of the plastic foam layer during influence of wind load etc. will arise and thus a construction with vastly improved qualities is obtained. The surface layer is in practice constituted of a fire resisting material, which in a possible fire counteract combustion of the plastic foam material and entrance into the structure of gases arising from the combustion. A further advantage with the defined structure is that the bar will be located immediately outside the surface layer, i.e. near to the inside of the structure, which normally is heated to a higher temperature than the one existing

on the outside of the structure. In the preferred case where the bar is constituted of metal the risk of corrosion thereby is reduced essentially and further the problem with condensation of water vapour in the structure is reduced.

Further preferable features of the structure and characteristics of the method according to the invention are subject of the claims 2-10.

BRIEF DESCRIPTION OF THE DRAWINGS

With reference to the enclosed drawings a closer description of an embodiment of the invention cited as an example, follows below.

In the drawings:

Fig 1 is a diagrammatic perspective view of a structure designed according to the invention;

fig 2 is a horizontal cut illustrating the connection of two wall sections and a bar;

fig 3 is a section illustrating a.o. the connection of a wall section to a foundation;

fig 4 is a vertical cut illustrating the connection of a wall section to an intermediate floor structure;

fig 5 is a vertical cut illustrating the design at the eave;

fig 6 is a vertical cut illustrating the design at the roof ridge; and

fig 7 is a horizontal cut exemplifying the design at a corner of the structure.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

The structure illustrated in fig 1 is illustrated as comprising two floor plans 1. The structure has a base socket 3, on which a base floor structure 40 is carried. This base floor structure 40 is preferably formed of pre-fabricated well isolated building elements. The walls on the floor plans are built by means of wall sections 4 and a frame structure formed by a bottom beam 5, which, when it concerns the lower floor plan, is fastened on the base socket 3 (or in an alternative way on the edge of the base floor structure) and which, when it concerns the upper floor plan 2, is fastened on the edge portion on an intermediate floor structure 7, and essentially horizontal joining members 8 such as hammer braces, with which the upper ends of the bars engage. The frame components 5, 6 and 8 are preferably constituted of profiles of metal, especially anti-corrosion treated steel or aluminium/aluminium alloy. The wall sections 4 have preferably the height of one floor.

As more closely appears from fig 2 each wall section 4 is constituted of a central layer, e.g. with a thickness of 150 mm, of a high quality isolation material, namely plastic foam and preferably polyurethane. Such a material is to prefer since it has closed cells and thus does not allow transport of damp at the same time as the material is not sensitive to damp. Each one of the wall sections 4 has a relatively stiff surface layer 60 fastened on its side intended to be located inwardly of the structure. This surface layer may be fastened to the plastic foam layer 50 by having the plastic foam foamed to the surface layer 60 to adhere thereto. As an alternative the isolation material layer 50 may be fabricated separately and in a following operation glued together with the surface layer 60. It is preferred that

the surface layer 60 is formed by a fire resistant material, preferably gypsum. In the example the surface layer 60 is illustrated as being formed by two part layers 70, 80, which are constituted by two gypsum wall boards for obtaining an excellent fire resistance. The two gypsum wall boards 70, 80 may be glued together in the case when both the boards 70, 80 are included in the prefabricated wall sections 4. However, an alternative embodiment within the scope of the invention is to design the prefabricated wall sections 4 with only one gypsum wall board 70 on the inside of the wall sections and to apply the second gypsum wall board 80 after the walls of the structure having been erected by means of the wall sections.

According to the invention it is preferred that also the side of the wall sections, which is intended to be turned outwardly, is provided with a relatively stiff surface layer 9. This surface layer 9 can also be constituted by a gypsum wall board or other stiff, fire resisting material.

By fig 2 is also shown how two wall sections 4 are mutually combined with a bar 6, which is arranged in a space 10 defined by the edge portions of the wall sections facing towards each other. The bar 6 has preferably a rectangular form in cross section and may be constituted of a box girder, the interior of which may be filled with a heat insulating material to improve the insulating capacity. The dimension of the bar 6 in the thickness direction of the wall sections is substantially less than the thickness of the wall sections. The space 10 for the bar is limited partly by the edge surface 11 of the insulating layer 50 on the two wall sections 4, and partly of such portions 12 of the surface layer 60 of the two wall sections, which extend past the adjacent insulating material portions of the wall sections while overlapping the bar. The wall sections 4 are fastened to the bar 6 by means of fixing members indicated by means of the

dotted lines 13 and extending through the surface layer portions 12 and engaging the bar. In practice the fixing members 13 can be constituted by self drilling and/or self threading screws, rivets or the like. When the wall sections 4 are assembled their surface layers will thus lie edge to edge in relation to each other at the butt joint 14. In case the board 80 is not included in the pre-fabricated wall sections the butt joint between these boards may of course be located at other place than exactly indexing the butt joint between the boards 70 comprised in the pre-fabricated wall sections.

In a direction towards the outside of the structure the pre-fabricated wall sections 4 form outside the bar 6 a gap 15 between each other. On the bar 6 several fastening members 16 are arranged (see also fig 1), which extend in the gap 15 from the bar 6 to the region of the outside of the wall sections. A rim 17 extends along the gap in its vertical direction and closes it in the region of the outside of the wall sections. The fastening members 16 have here the character of bolts, which are mutually separated in the vertical direction and the one ends of which are fastened to the bar 6 by e.g. welding at the heads of the bolts. The rim 17 has holes 18 to allow the bolts to go through the rim and their ends protruding from the bar 6 have a thread, with which a nut 19 engages. The nut serves to press the rim 17 in the direction towards the bar 6 by tightening from outside and the rim 17 has preferably a recess 20 containing the end portion of the bolt 16 and the associated nut 19. The rim 17 may be fabricated in one piece as for the sake of simplicity is indicated in fig 2 but it can of course be fabricated by two rim parts which are mutually fixed to each other and lie against each other along a joint plan 21 indicated by a dotted line. The rim 17 has a portion 22 extending into the gap 15 and portions 23 which on both sides of the rim abut against the

outside of the wall sections. In the case the rim 17 is fabricated of two rim parts it is thus preferred that the outer rim part has a larger width than the inner one.

After the rim 17 has been put in place the gap 15 is filled with an insulating material and especially plastic foam, said edge surfaces 11 of the wall sections, the bar 6 and the rim 17 serving as mould elements. For injection of the plastic foam at least two holes are arranged in the rim 17, the one of which serves for insertion of an injection nozzle and the other one for evacuation of air. By such an injection of plastic foam the gap 15 will efficiently be filled, insulated and sealed, plastic foam material also taking care of the sealing of small openings between the wall sections 4 on one hand and the bar 6 and the rim 17 and also between the bolt 16 and the rim 17 on the other hand.

The rim 17 is preferably of such a material, especially wood, which is suitable for fastening on the outside of an outer covering indicated with 23 by means of nailing, riveting, screwing or the like. Since the fastening bolts 16 are fastened to the bar 6 the outer covering will in all essentials be carried by the bar 6, which is very advantageous since it, as a consequence of the production of the wall sections of plastic foam insulation, else would be difficult to obtain a reliable fastening of the outer covering.

In case the outer covering is intended to be constituted by facing bricks, the bolts 16 could be prolonged outwardly and be arranged to be fastened in the brick covering for stabilisation of this transversally, either by the bolts themselves or indirectly via holding cramps fastened to the bolts. In such a case the rim 17 only has to

be designed to provide a necessary closing of the opening of the gap for the subsequent injection of plastic foam into the gap 15. The rim would then not have to be designed for enabling nailing etc.

The gap 15, which contains the bar 6, and which is defined by the edge portions of the wall sections 4, which are facing each other, has a width, which from the side of the surface layer 60, facing towards the outside of the structure, and all the way to the outside of the wall sections, is at least equal to the width of the bar and exceeds preferably to a small extent the width of the bar. The adjacent edge surfaces 11 of the two wall sections are e.g. mutually parallel in the erected condition of the wall sections and the outer edge of the outer layer 9 ends flush with the edge surfaces 11. A wall section can thereby be inserted between two pre-mounted bars from the inside of the structure.

As appears from fig 3 the bottom beam 5 can be constituted of a metal profile with a rectangular, hollow cross-section. The bottom beam is in a way known per se rigidly fastened to the foundation, which in fig 3 is constituted by the base socket 3. The bottom beam 5 is received in a recess 25 in the lower edge of the wall sections 4. Each bar 6 is connected to the bottom beam 5 so that the lower end of the bar 6 rests on the upper side of the bottom beam while guiding of the bar relative to the bottom beam is obtained by an upwardly directed projection 24 on the upper side of the bottom beam (see also fig 1 and 2), which projection is received in the lower portion of the cavity of the bar. The projection 24 has suitably rectangular cross section or else such a cross section that it fits relatively tightly in the cavity of the bar and thus can hold the bar freely standing before the rest of the parts in the structure are mounted, the cross section of the projection being chosen so that

it prevents the bar from rotating about its longitudinal axis. Fixation of the bottom beam 5 and the bar 6 against separation may be done by fixation members 26, e.g. in form of rivets, screws or the like, extending through the bar and penetrating into the projection. If desired the cavity in the bottom beam 5 may be filled with isolation material, e.g. plastic foam. Between the base socket 3 and the lower edge of the wall sections 4 a sealing strip may be applied, heat insulating plastic foam be injected etc.

The bottom beam 5 could in an alternative embodiment also be formed as an U-profile, with its both legs directed upwardly and receiving between each other the lower ends of the bars 6.

As appears from fig 4 and also from fig 1 a joining member 8 connects the upper ends of the bars 6. The joining member 8 has preferably a profile with two parts 28, 30 arranged at an angle to each other, particularly at a right angle to each other, the one 28 of which is essentially horizontal and located above the upper ends of the bars 6. The second part 30 of the joining member 8 is generally vertical and directed upwardly, said part being located in the region of the side of the bars facing outwardly. The two parts 28, 30 of the joining member 8 form a seat for receiving an edge portion of the intermediate floor structure 7, which preferably is formed by pre-fabricated building elements. The intermediate floor structure 7 is fixed to the joining member 8 by means of nails, rivets, screws or the like, indicated at 31, which penetrate through the vertical part 30 of the joining member.

As appears from fig 4 the upper ends of the bars 6 are located in level with the upper parts of the wall sections 4 and the horizontal part 28 of the joining member

8 will thus be located above the upper edge surface of the wall sections. The joining member 8 has in addition a profile part 46 connected to the part 28 so that the joining member receives a Z-like profile with the parts 30, 46 forming the legs and part 28 forming the web. The part 46 extends downwardly and engages about the surface layer 60 of the wall section 4, both layers 70, 80 of which here are intended to be included in the pre-fabricated wall section. In case the layer 80 is applied afterwards the profile part 46 will be so formed that it only engages about the upper edge portion of the part layer 70 which is included in the pre-fabricated wall section, and is thus located between the part layers 70, 80. The mutual engagement between the joining member 8 and the bars 6 may be provided in different ways, e.g. by fixing members, such as screws, rivets or the like extending through the part 28 of the joining member and plate pieces attached to the bars, but it is preferred that the joining member is provided with projections 29 at the lower side of the part 28, which projections 29 penetrate into the upper part of the cavity of the bars. These projections 29 are formed in analogy with the previously described projections 24 on the bottom beam. Lengthening of the joining member may be done in a way known per se or as an alternative two joining member sections can be connected to a bar owing to the fact that both sections have projections extending into the cavity of the bar. To construct the wall in the upper floor 2 a bottom beam 5, corresponding to the previously in fig 3 described one, is applied on the upper edge portion of the intermediate floor structure 7, and then bars 6, wall sections 4 etc are applied in an analogical way also for the floor 2. Opposite the floor structure 7, a filling piece 32 made of an insulating material, especially plastic foam, preferably polyurethane, is applied, said filling piece having on its outer side a surface layer 9, especially a gypsum board. Laps 32 arising relative to the under- and abovelying wall sec-

tions, are sealed by means of sealing strips, by injecting plastic foam etc.

By fig 5 it appears that also the bars 6 on floor 2 at their upper ends are connected to a joining member 8 in analogy to what has been described in fig 4. This joining member 8 forms with its two angled parts 28 and 30 a seat for receiving pre-fabricated roof structure elements 34, which are provided with necessary insulation and which otherwise can be of an arbitrary kind. As appears in fig 5 and 6 these roof structure elements 34 extend obliquely upwardly/inwardly of the structure up to the region of the ridge portion 35 of the building structure. Such roof structure elements are arranged on each one of the two analogically constructed longitudinal side walls in the structure and meet in the region of the ridge portion of the structure and are there mutually fixed. As especially appears from fig 6 the fixing of the roof structure elements meeting each other is effected by means of fixing members, such as nails, rivets, screws or the like, diagrammatically indicated with the dotted line 36, said fixing members extending through shoulders 37 formed on the roof structure elements meeting each other. In the region above the shoulders 37 sealing can take place by means of plastic foam 38 or by means of other suitable insulation material after the joining. The roof structure elements 34 are fixed to the joining members 8 by means of fixing members indicated at 31, said fixing members extending through the vertical leg 30 of the joining member and penetrating into the roof structure elements. Generally horizontal tie rods 39 extend between the opposite walls of the structure and are at these opposite walls fixed to the joining members 8 by means of the fixing members indicated at 31 so that thus an efficient mutual interlocking of the walls, roof structure elements 34 and tie rod 39 is obtained. As appears from fig 1 the tie rods 39 can partly extend freely within the floor plan 2 and below the insulated

roof structure elements 34. In such a case only the end portions of the tie rods 39 extend into recesses arranged in the boundary zone between two adjacent roof structure elements. Beams 40 and ribs 41 for carrying an outer roof covering 42 can be integrated in the roof structure elements 34 or else as an alternative be applied afterwards.

As appears from fig 5 a filling piece 43 of polyurethane with a surface layer 9 can in analogy with the previously described filling piece be applied above the wall sections for the upper floor plan 2, the lap 44 arising relative to the underlying wall sections may be filled by means of sealing strips, plastic foam etc.

In fig 7 a possible design is illustrated at a corner of the structure. One of the wall sections 4 illustrated there is designed in analogy with the already described wall sections. The fixation of its surface layer 60 to a bar 6 is done as previously by fixing members engaging in the surface layer and the bar, and not until this is done the second wall section 4a illustrated in fig 2 is applied, the edge portion of which being located nearest to the corner region has a design which diverge a little from the design of the first mentioned wall section 4 to obtain an adjustment to the latter. Otherwise the design is, what concerns fastening members 16, rims 17 etc, analogical to the design described in fig 2. It should here be noted that a particular filling piece 45 has been applied to the outer corner region.

In the structure according to the invention it is in principle sufficient that the base floor structure, the intermediate floor structure and the roof structure obtain support at the two opposite longitudinal side walls of the structure, or in other words the walls extending parallel with the roof ridge. Along the gables the bars 6 could thus extend continuously from the base socket

or the corresponding all the way up to the region of the roof structure. Thus, the joining members 8 could then be unnecessary and the wall forming sections could stand directly on each other without intermediate floor structure sections.

When erecting the structure, firstly the lowermost bottom beam 5 is applied on the base socket 3 or corresponding, then wall sections 4, bars 6 and joining members 8 are applied. The order in which this is done may vary. It is possible to successively apply a wall section, a bar, a wall section and a bar and so on, and the joining member 8 may be applied successively as the wall is erected or afterwards. However, it has turned out that it is more advantageous to erect the whole or at least parts of the frame, intended for one floor plan, by means of bottom beams 5, bars 6 and joining members 8 in one first step and to adjust these components vertically. Not until then are the wall sections 4 applied. Firstly, these have with advantage been laid down onto the floor structure in question. Then the wall sections 4 are raised one after one with the recess 25 arranged in their lower edge located astride of the bottom beam 5 and the wall sections are pushed in between two adjacent bars respectively. The loosely applied joining member 8 and its projection 29 are displaced somewhat upwardly so that the wall section in question can pass the profile part 46, which thereafter engages about the upper edge of the wall section owing to the joining member being brought downwardly, and thus holds the same in situ until the final fixation. If the whole frame or essential parts thereof or at least two adjacent bars are erected and then the wall sections are applied, the risk is reduced for such accumulation of dimensional errors that the structure will not be "closed". Such assembling technique is impossible with a design according to the Swedish specification 440 674. Then the intermediate floor structure is applied, whereupon the structure is erected at

the second floor plan in a similar way. Finally the roof structure elements 34 are applied. These are lifted in situ by means of a hoisting crane or the like so that the ends of the elements located at the eave firstly are located in situ and then the upper ends of the elements, which shall be connected to each other, are approached to each other and fixed in the region of the roof ridge. Then sealing operations, applying of rims 17, applying of outer covering and roof covering etc are done in a way which should be obvious from the previous description.

It is obvious that the invention not only is limited to the above described embodiment. Thus, the practical embodiment may vary in several ways within the scope of the following claims. As an example one can mention that the gap could be filled with insulating material and the rim 17 applied thereafter.

Claims

1. A building structure of the kind comprising a foundation (3, 7), such as a base plate, base socket, floor structure or the like, at least two pre-fabricated wall sections (4) located on the foundation and an essentially vertical bar (6), made of e.g. metal, which is arranged in a space (10) defined by the edge portions of the wall sections facing towards each other, the dimension of the bar in itself, considered in the thickness direction of the wall sections, being less than the thickness of the wall sections, and said wall sections comprising a high quality isolation material (50), such as plastic foam, c h a r a c t e r i z e d in that each one of the pre-fabricated wall sections (4) on its side, which is intended to face inwardly of the structure, has a relatively stiff surface layer (60) secured to the wall section, that the space (10) for the bar is partly limited by such portions (12) of the surface layer (60) of the two wall sections (4) which extend past the adjacent isolation material portions of the wall sections while overlapping the bar, and in that the wall sections (4) are secured to the bar (6) by means of fixing members (13) extending through said surface layer portions (12), which extend past the adjacent isolation material portions of the wall sections, and engaging the bar.

2. A structure according to claim 1, c h a r a c t e r i z e d in that the pre-fabricated wall sections (4) form between each other and outwardly of the bar (6) a gap (15), that one or several fastening members (16) are arranged on the bar, said fastening members (16) extending in the gap from the bar (6) to the region of the outside of the wall sections, that a rim (17) extends

along the gap and closes the same in the region of the outside of the wall sections, that the rim and/or the fastening members (16) serve for fastening an outer covering (23) on the structure, and in that the gap (15) is filled afterwards with an isolation material, especially plastic foam, with the edge portions of the wall sections, the bar and the rim serving as mould form.

3. A structure according to claim 2, characterized in that the fastening members (16) have means (19) for fastening the rim (17), which in its turn serves to fasten the outer covering to the rim and thereby to the structure by nailing, screwing or the like.

4. A structure according to claim 2 or 3, characterized in that the rim (17) has a portion (22) extending into the gap (15) and portions (23) which are located against the outside of the wall sections on both sides of the gap.

5. A structure according to any previous claim, characterized in that the space, containing the bar (6) and being defined by the portions of the wall sections, facing towards each other, has a width being at least equal to the width of the bar, considered from the outer surface of the inner surface layer (60) and to the outside of the wall sections, whereby it is possible to interpose a wall section between two pre-mounted bars from the inside of the structure.

6. A structure according to any previous claim, a joining member (8) joining the upper ends of two or several bars (6) each arranged between two wall sections (4) and serving to support a floor structure or a roof structure, characterized in that the joining member (8) has a profile with two parts (28, 30) arranged at

an angle to each other, one (28) of said parts being generally horizontal and placed above the wall section or the wall sections respectively and the second part being generally vertical and directed upwardly, and in that the two parts of the joining member (8) form a seat for receiving an edge portion of the floor structure or the roof structure, said joining member (8) having preferably an additional profile part (46) being directed downwardly and engaging about an upper edge portion of the wall sections on the outer side of their surface layer (60).

7. A structure according to claim 3, c h a r a c t e r i z e d in that the fastening members (16) are constituted of bolts, the ends of which being turned away from the bar (6) have a thread for engagement with a nut (19), which presses the rim (17) towards the bar (6).

8. A structure according to any previous claim, wherein a bottom beam (5) is arranged on the foundation (3, 7), and received in recesses (25) made in the lower edge of the wall sections (4), c h a r a c t e r i z e d in that the bottom beam has generally vertical projections (24), with which the lower end of the bars (6) in question engages.

9. A method for providing a structure according to claim 1, wherein at least two pre-fabricated wall sections (4) are arranged on a foundation (3, 7) such as a base plate, a base socket, a floor structure or the like, and a generally vertical bar (6), e.g. made of metal, is arranged in a space (10) defined by the edge portions of the wall sections, facing towards each other, and the dimension of the bar in itself in the thickness direction of the wall sections is chosen less than the thickness of the wall sections and the wall sections have been made to comprise a high quality isolation material, such as plastic foam, c h a r a c t e r i z e d in that each one of

the pre-fabricated wall sections (4) on its side intended for location inwardly of the structure has been caused to comprise a relatively stiff surface layer (60), e.g. one or more gypsum boards, fastened to the wall section, that the space for the bar (6) is caused to partly be limited by such portions (12) of the surface layer (60) of the two wall sections, which extend past the adjacent isolation material portions of the wall sections while overlapping the bar, and in that the wall sections (4) are fastened to the bar (6) by means of fixing members (13), which are caused to extend through the surface layer portions (12) which extend past the adjacent isolation material portions of the wall sections, and to engage the bar.

10. A method according to claim 9, c h a r a c t e -
r i z e d in that the pre-fabricated wall sections (4) are designed and applied so that they outwardly of the bar (6) form a gap (15) between each other, that one or several fastening members (16) is/are arranged on the bar (6), said fastening members extending in the gap (15) from the bar to the region of the outside of the wall sections, that a rim (17) is fastened by means of fastening members so that the rim extends along the gap and closes the same in the region of the outside of the wall sections, that the gap (15) is filled with an isolation material particularly plastic foam with the edge portions of the wall sections, the bar and the rim serving as mould elements, and in that an outer covering (23) is applied on the outside of the structure by fastening to the rim.

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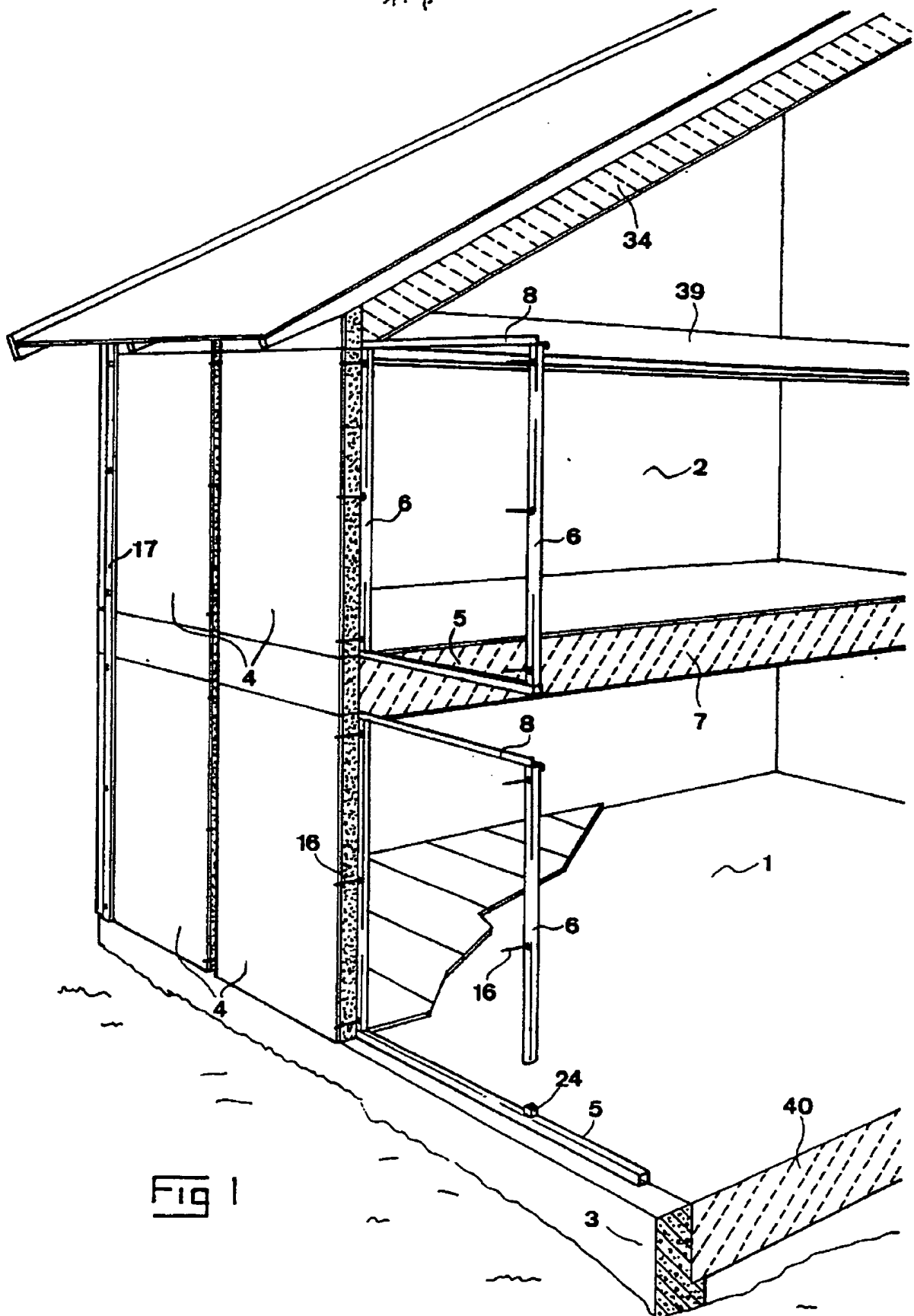


Fig 1

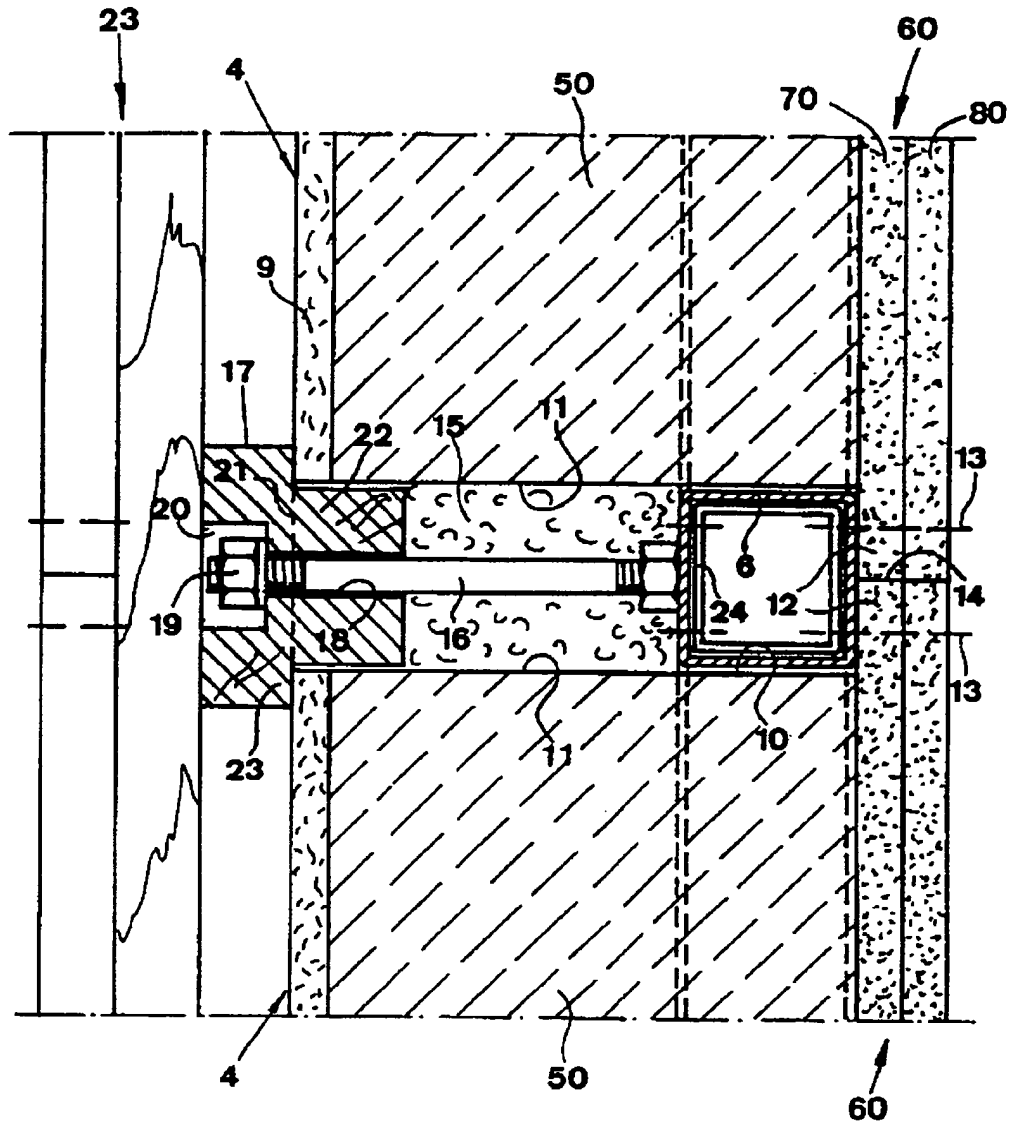


FIG 2

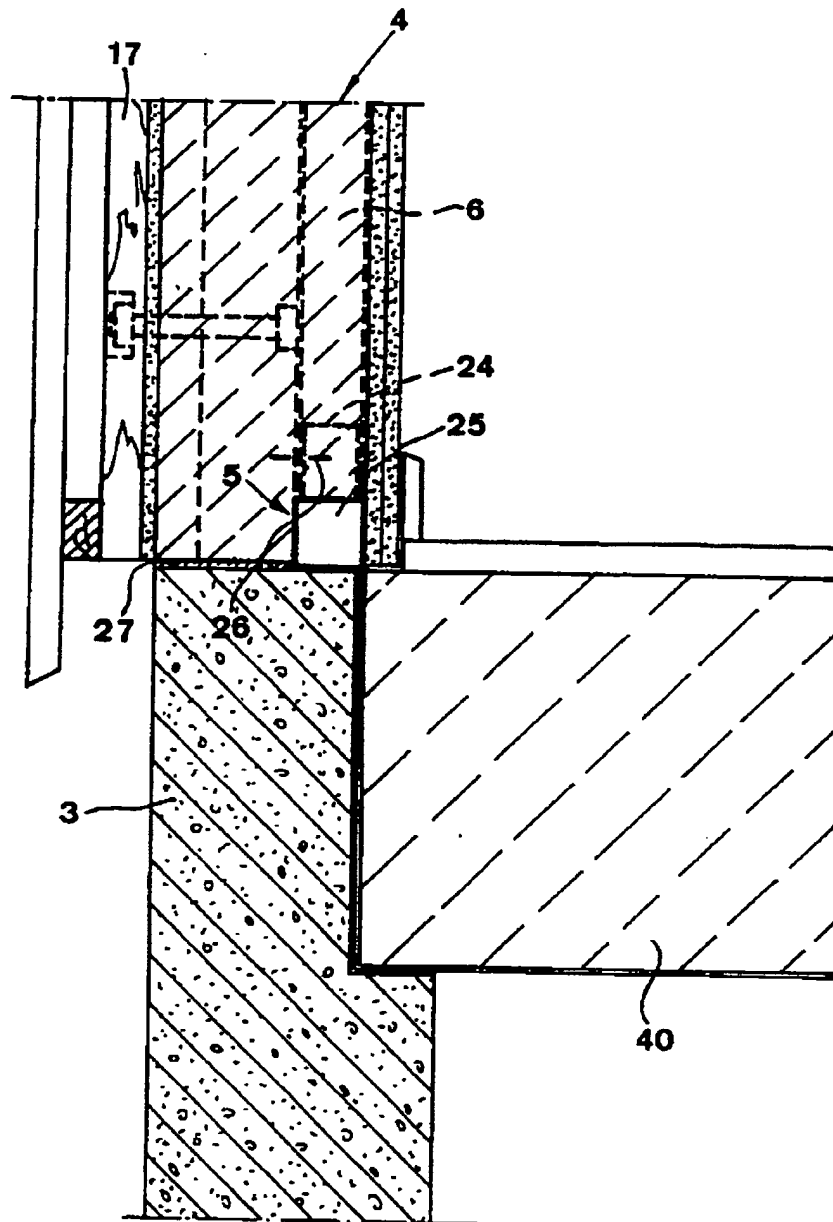


FIG 3

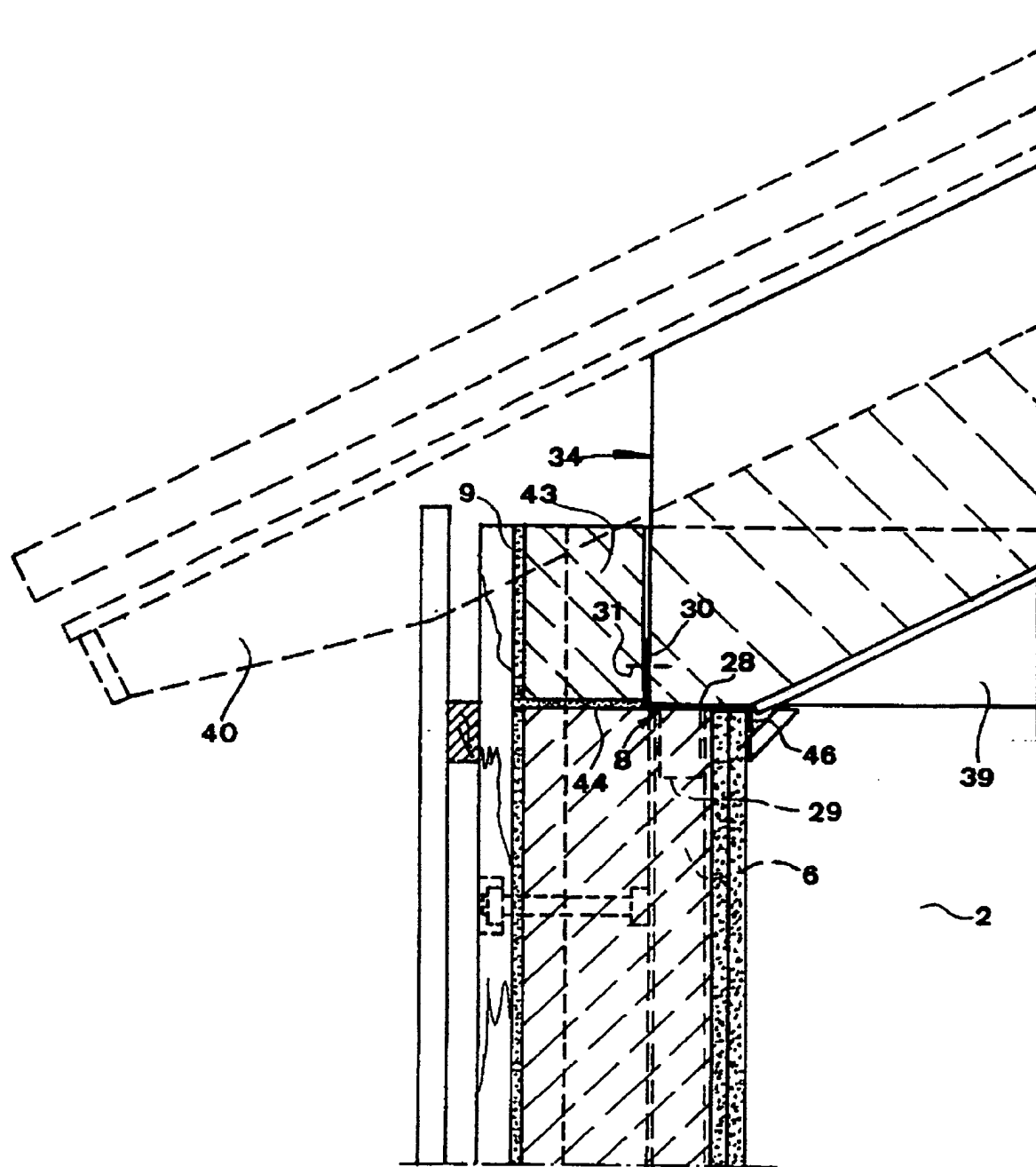


Fig 5

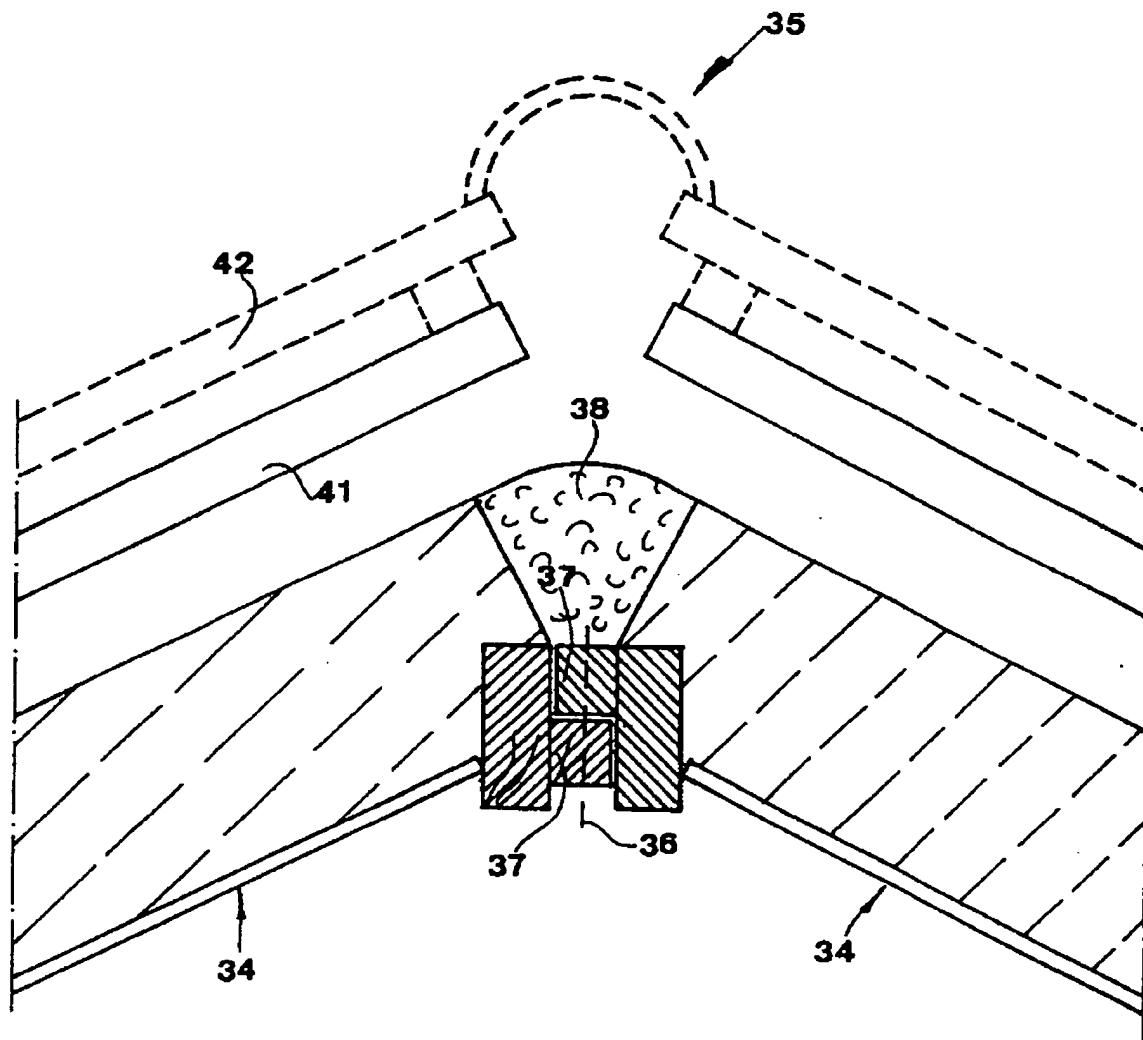


Fig 6

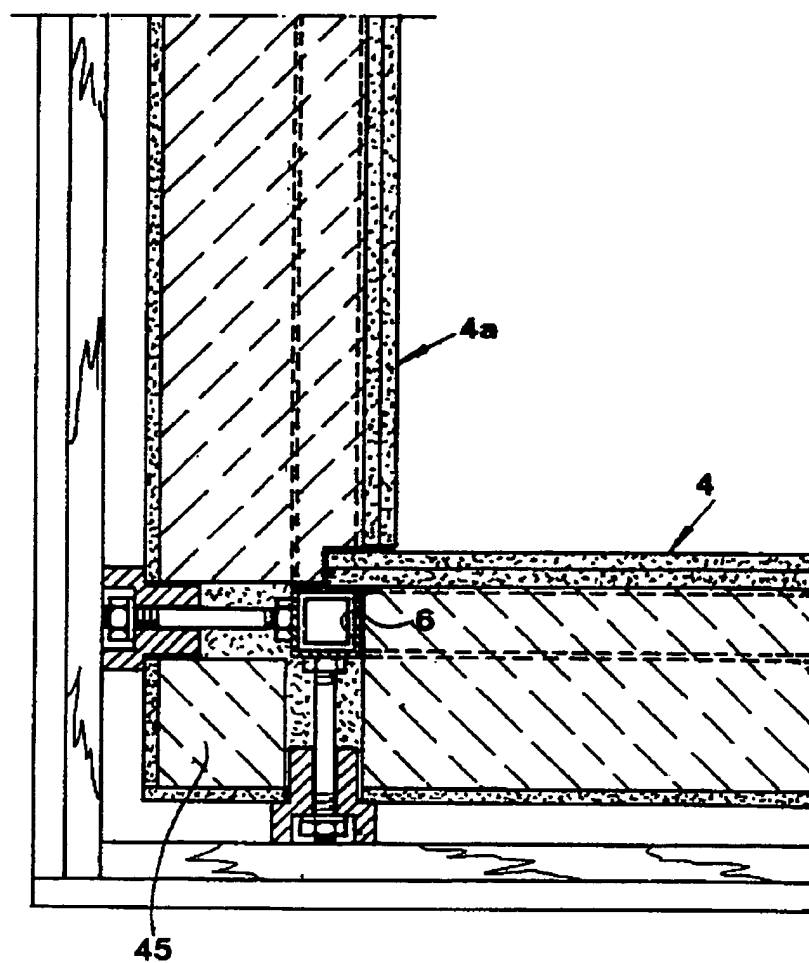
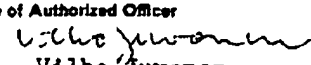
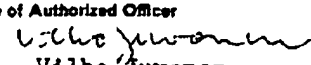
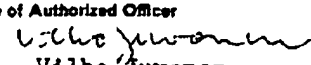


FIG 7

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE86/00414

| I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC 4 E 04 B 1/94 // E 04 B 1/24, E 04 C 2/46 | | | | | | | | | | | | | | | | | | | | |
|---|---|--------------------------|---|--|--------------------------|------------------------------------|--|---------------------------------|-----------------------|---|------|---|--|---|---|--|------|---|--|------|
| II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched *</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC 4</td> <td style="padding: 5px;">E 04 B 1/24, /82, /94; E 04 C 2/46</td> </tr> <tr> <td style="padding: 5px;">US C1</td> <td style="padding: 5px;">52: 79.1, 238, 481, 482, 580</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *</div> <p style="padding: 5px;">SE, NO, DK, FI classes as above</p> | | | Classification System | Classification Symbols | IPC 4 | E 04 B 1/24, /82, /94; E 04 C 2/46 | US C1 | 52: 79.1, 238, 481, 482, 580 | | | | | | | | | | | | |
| Classification System | Classification Symbols | | | | | | | | | | | | | | | | | | | |
| IPC 4 | E 04 B 1/24, /82, /94; E 04 C 2/46 | | | | | | | | | | | | | | | | | | | |
| US C1 | 52: 79.1, 238, 481, 482, 580 | | | | | | | | | | | | | | | | | | | |
| III. DOCUMENTS CONSIDERED TO BE RELEVANT * <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="border-bottom: 1px solid black;">Citation of Document, ** with indication, where appropriate, of the relevant passages **</th> <th style="width: 10%; border-bottom: 1px solid black;">Relevant to Claim No. **</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">DE, A1, 2 125 537 (C HILDEBRAND et al) 13 April 1972 & FR, 2109679</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1, 9</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">DE, A1, 2 423 701 (O C ECKEL) 3 April 1975 & FR, 2244882 GB, 1420559 CA, 1007991</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1, 9</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">DE, C1, 3 320 240 (P LENZ) 4 October 1984</td> <td style="text-align: center; vertical-align: top; padding: 5px;">4</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">GB, A, 2 076 870 (J WOOD) 9 December 1981</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1, 9</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">FR, A1, 2 419 367 (M DE SAN) 9 March 1978</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1, 9</td> </tr> </table> | | | Category * | Citation of Document, ** with indication, where appropriate, of the relevant passages ** | Relevant to Claim No. ** | X | DE, A1, 2 125 537 (C HILDEBRAND et al) 13 April 1972 & FR, 2109679 | 1, 9 | X | DE, A1, 2 423 701 (O C ECKEL) 3 April 1975 & FR, 2244882 GB, 1420559 CA, 1007991 | 1, 9 | A | DE, C1, 3 320 240 (P LENZ) 4 October 1984 | 4 | X | GB, A, 2 076 870 (J WOOD) 9 December 1981 | 1, 9 | X | FR, A1, 2 419 367 (M DE SAN) 9 March 1978 | 1, 9 |
| Category * | Citation of Document, ** with indication, where appropriate, of the relevant passages ** | Relevant to Claim No. ** | | | | | | | | | | | | | | | | | | |
| X | DE, A1, 2 125 537 (C HILDEBRAND et al) 13 April 1972 & FR, 2109679 | 1, 9 | | | | | | | | | | | | | | | | | | |
| X | DE, A1, 2 423 701 (O C ECKEL) 3 April 1975 & FR, 2244882 GB, 1420559 CA, 1007991 | 1, 9 | | | | | | | | | | | | | | | | | | |
| A | DE, C1, 3 320 240 (P LENZ) 4 October 1984 | 4 | | | | | | | | | | | | | | | | | | |
| X | GB, A, 2 076 870 (J WOOD) 9 December 1981 | 1, 9 | | | | | | | | | | | | | | | | | | |
| X | FR, A1, 2 419 367 (M DE SAN) 9 March 1978 | 1, 9 | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>* Special categories of cited documents: **</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div> | | | | | | | | | | | | | | | | | | | | |
| IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="text-align: center; padding: 5px;">1986-11-11</td> <td style="text-align: center; padding: 5px;">1986 -11- 2 0</td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;">International Searching Authority</td> <td style="border-bottom: 1px solid black; padding: 5px;">Signature of Authorized Officer</td> </tr> <tr> <td style="text-align: center; padding: 5px;">Swedish Patent Office</td> <td style="text-align: center; padding: 5px;">  Vilho Juvonen </td> </tr> </table> | | | Date of the Actual Completion of the International Search | Date of Mailing of this International Search Report | 1986-11-11 | 1986 -11- 2 0 | International Searching Authority | Signature of Authorized Officer | Swedish Patent Office |  Vilho Juvonen | | | | | | | | | | |
| Date of the Actual Completion of the International Search | Date of Mailing of this International Search Report | | | | | | | | | | | | | | | | | | | |
| 1986-11-11 | 1986 -11- 2 0 | | | | | | | | | | | | | | | | | | | |
| International Searching Authority | Signature of Authorized Officer | | | | | | | | | | | | | | | | | | | |
| Swedish Patent Office |  Vilho Juvonen | | | | | | | | | | | | | | | | | | | |